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# (54) TOOTHBRUSH WITH RESILIENTLY FLEXIBLE HEAD

ZAHNBUERSTE MIT FEDERNDEM KOPFTEIL

BROSSE A DENTS A TETE ELASTIQUEMENT SOUPLE

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(56) References cited:
**DE-B- 1 233 821**
**FR-A- 442 832**
**US-A- 2 266 195**
**US-A- 2 676 350**
**US-A- 3 188 672**
**US-A- 4 488 328**
**US-A- 4 691 405**



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## Description

The present invention relates to a novel article, being a toothbrush, and in particular to a toothbrush having a flexible zone in its head.

When brushing one's teeth, particularly with a conventional toothbrush having a rigid head, it can be difficult to reach all parts of the teeth in order to brush the teeth satisfactorily. It is also difficult with such brushes to maintain an optimum angle between the teeth and the head of the toothbrush for effective brushing and cleaning, necessitating continual repositioning of the brush in the hand throughout the brushing process. Consequently, there is a tendency to apply excess brushing pressure to some teeth and insufficient pressure to other teeth. The resultant combination of excess brushing pressure and inadequate cleaning or bad cleaning technique can result in damage to both teeth and gums.

Although angled-head toothbrushes have been suggested as an attempt to overcome some of these difficulties, they do not satisfactorily meet all the requirements.

Proposals have also been made for toothbrushes having flexible handles or flexible zones in their handles to assist in accommodating the orientation of the bristle-bearing head of the brush to the profile of an individual's teeth and gums. Such toothbrushes are disclosed for example in EP-A-0336641, US 4520526, DE-OL-3640898, DE-OL-3612108, CH-0155730 and IT-485723. US 4691405 and DE 1233821 disclose toothbrushes having heads which are in the form of two segments surrounded by a frame. US 4488328 discloses a toothbrush with a head between the arms of a "Y" shaped frame. US 3188672 discloses a toothbrush head divided into segments by open grooves.

In some circumstances it is desirable to further improve the flexibility of the head relative to the direction of the handle of the toothbrush.

Accordingly the present invention provides a toothbrush having a handle and at one end thereof a bristle-bearing head wherein the head is in the form of two or more segments flexibly and resiliently linked to each other and/or to the handle, one or more of the segments being bristle bearing, *characterised* in that the head has bristles mounted on one face and the opposite face has one or more grooves therein, the said segments being the lands between the grooves, the grooves being wholly or partly filled with an elastomeric material.

The toothbrush head of this invention, being flexible, can flex under the action of toothbrushing so as to accommodate itself to the differing profiles of individual users' teeth. In particular, teeth generally lie in a "C" shaped curve within the upper and lower jaw, the row of teeth consequently having a convex outer curve and a concave inner curve. The flexible head of the toothbrush of the invention can bend to accommodate itself to both the convex and concave curves of the teeth generally better than would be the case with a conventional rigid-headed toothbrush.

In a first embodiment of this invention, the head may be formed as an integral extension to the handle. In a second embodiment the handle may be extended into the form of a frame wholly surrounding the head, the space between the head and the frame being partly or wholly filled with an elastomeric material. Within such a frame the head may be integrally formed, or may be made as a separate part and fastened into the frame.

In the toothbrush of this invention the lands between the grooves comprise the segments, and flexible resilient liking occurs about the thinned regions of head material at the bottom of the grooves.

In the toothbrush of this invention, one or more of the grooves should be transverse to the longitudinal axis of the handle, to provide flexibility of the head in a plane containing this axis. Additionally or alternatively there may be one or more grooves aligned parallel to the longitudinal axis of the handle. Preferably there are only transverse grooves. Suitably there need be only one such transverse groove.

In the toothbrush of this invention, the depth and/or width of the grooves, and/or the frequency of the grooves per unit distance, along the length and/or across the breadth of the head may be varied. By variation in this way the flexibility and/or resilience of liking and consequently of the whole head along the length and/or across the breadth of the head may be varied. For example by having deeper grooves at the end of the head furthest from the handle, the head can be made to be more flexible at this end. Preferably flexibility and/or resilience only along the length of the head is controlled in this way.

In this grooved form of head, one or more of the grooves may be wholly or partly filled with an elastomeric material. In this way too the flexibility and/or resilience of the head may be varied and contamination of the grooves by for example toothpaste deposits etc. may be reduced or avoided completely. The colour of the elastomeric material may be the same as that of the material of the head, or it may be different thereby achieving a distinctive striped or otherwise patterned appearance.

When the head is of the above described grooved form, and is wholly or partly surrounded by a frame, the frame preferably completely surrounds the head. The head may be linked to the frame handle at various points around the perimeter of the head, but is preferably linked to the frame at one or more points in a plane that includes the longitudinal axis of the handle. The head may alternatively or additionally be linked at points in a plane at 90° to the longitudinal axis of the handle. These links may be by bridging portions of the material of the head or frame, and by varying the dimensions of these bridging portions the degree of flexibility and/or resilience of the linking may be varied. For example the degree of flexibility and/or the resilience of these links can be made such that the head may be made to rock about these links, in addition to flexing.

In all forms of the head in which a frame is present, the frame may bear bristles, which may have the same or different distribution, length, orientation, colour or stiffness to those on the head. Conveniently bristles when present on the frame may be shorter than those on the head.

The bristles may be uniformly distributed over the head, and the frame, if present, but preferably the bristles are distributed in discrete tufts. There may be one or more tufts per segment.

By varying the degree of the filling of the space(s) between the head and the frame with an elastomeric material and the material used the degree of flexibility and/or resilience of the head may be varied.

The toothbrush (i.e. the handle, head and bristles) of the invention may be made of materials which are conventional in the manufacture of toothbrushes, especially plastics materials. Suitable plastics materials include, for example, polyamides and polypropylenes. An example of a suitable polyamide is the material 'Ultramid B3'™ (marketed by BASF, Federal Republic of Germany), having a modulus of elasticity (DIN 53452) of 3000. An example of a suitable polypropylene is the material 'Novolene 1100 HX'™ (marketed by BASF, Federal Republic of Germany) which is a homopolymer and has a modulus of elasticity (DIN 53457) of 1400. Such a polypropylene homopolymer may optionally be used in admixture with a polypropylene block co-polymer, such as the material 'Novolene 2500 HX'™ ™ (marketed by BASF, Federal Republic of Germany) for example in an 80:20 mixture by weight (1100 HX : 2500 HX).

The handle may be of a shape which is conventional in the manufacture of toothbrushes. It may however be advantageously made in the form described in EP 0336641A, the contents of which are included by reference, more particularly as described in column 1 lines 36-49 thereof.

In use, the toothbrush of this invention may be used for cleaning the teeth by an entirely conventional toothbrushing hand action, preferably in a manner recommended by dental health authorities. The toothbrush of the invention may also be used in electrically driven toothbrushes.

The invention will now be described by way of example only, with reference to the accompanying drawings, in which:

Fig 1 shows a toothbrush head integral with the handle and divided into segments by grooves.

Fig. 2 shows a toothbrush head divided into segments by grooves, and within a frame extension of the handle.

Fig. 3 shows a variant of the head of Fig 2 in which the head is divided into two segments by a single groove.

Referring to Figs 1A, 1B, 1C, and 1D, a toothbrush head (11) is formed integrally at one end of a handle (12). The head (11) and handle (12) are shown in an underside view in Fig 1A, in a top view in Fig 1B, in an overall side view in Fig. 1C, and in a longitudinal section about the line A-A in Fig. 1D.

The head (11) has two substantially parallel faces, and in a top face are mounted bristles distributed in a plurality of tufts (13). The lower face is divided by a series of parallel grooves (14) transverse to the longitudinal axis A-A of the handle into segments (15) being the lands between the grooves (14), leaving a thinned and consequently flexible and resilient region of head material (16) at the bottom of the grooves (14). The bristles (13) are mounted in these segments (15).

The grooves (14) are partly filled with an elastomeric material (17), which is of a different colour to the head material, imparting a striped appearance to the underside of the head.

In Fig. 1D the head (11) is shown as flexing under the application of pressure at the point indicated by the arrow, into a convex curve of bristle tufts (13), accommodating itself to the curve of the inner side of the line of the teeth to assist thorough cleaning, whilst its resilience assists gentle cleaning.

Referring to Figs 2A, 2B, 2C, 2D and 2E, a toothbrush head (21) is surrounded by a frame (22) extension integrally formed at one end of a handle (23), which are shown in an underside view in Fig 2A, in a top view in Fig 2B, in an overall side view in Fig 2C, in a cross section about the line B-B in Fig 2D, and in a longitudinal section about the line A-A in Fig. 2E

The head (21) is flexibly and resiliently linked to the frame (22) by bridging portions (24) of thin head/handle material, at two points in line with the longitudinal axis of the head (21) and frame (22), the upper part of which may be closed with a thin diaphragm (not shown) of elastomeric material.

The head (21) has a construction similar to that of the head shown in Fig 1, i.e. it has two substantially parallel faces, in a top face being mounted tufts (26) of bristles, the lower face being divided into segments (27) by lateral grooves (28).

In Fig 2E, the grooves (28) are shown as being partly filled with an elastomeric material (29) of a different colour to that of the head material, imparting a striped appearance to the underside of the head (21).

Referring to Figs 3A, 3B, 3C and 3D, a toothbrush head (31) is surrounded by a frame (32) extension integrally formed with a handle (33) which are shown in an underside view in Fig 3A, in a top view in Fig 3B, in an overall side view in Fig 3C, and in a longitudinal section about the line A-A in Fig. 3D.

The head (31) is flexibly and resiliently linked to the frame (32) by bridging portions (34) of thin head/handle material, at two regions in line with the longitudinal axis of the head (31), leaving a narrow gap (35) between the head (31) and frame (32), the upper part of which may be closed with a thin diaphragm (not shown) of elastomeric material.

The head (31) has a construction similar of that of the head of Fig 2, with an upper face having tufts (36) of

bristles mounted therein. The lower face is divided into two segments (37) by a single lateral groove (38).

In Fig 3D, the single lateral groove (38) is shown partly filled with an elastomeric material (39) of a colour different to that of the head material, imparting a striped appearance to the underside of the head (31).

The two bridging portions (34) are wider than those shown in Fig 2, and hence the head (31) does not so readily undergo rocking motion about these bridging portions (34) as does the head of Fig 2.

## Claims

1. A toothbrush having a handle (12, 23, 33) and at one end thereof a bristle-bearing head (11, 21, 31) in the form of two or more segments (15, 27, 37) flexibly and resiliently linked to each other and/or to the handle (12, 23, 33), one or more of the segments (15, 27, 37) being bristle bearing, *characterised* in that the head (11) has bristles (16) mounted on one face and the opposite face has one or more grooves (14) therein, the said segments (15) being the lands between the grooves (14), the grooves (14) being wholly or partly filled with an elastomeric material (17).

2. A toothbrush according to claim 1 *characterised* in that the toothbrush head (11) is formed integrally at one end of a handle (12), the head (11) has two substantially parallel faces, in a top face are mounted bristles distributed in a plurality of tufts (13), the lower face is divided by a series of parallel grooves (14) transverse to the longitudinal axis A-A of the handle into segments (15) being the lands between the grooves (14), leaving a thinned and consequently flexible and resilient region of head material (16) at the bottom of the grooves (14), the bristles (13) are mounted in these segments (15), and the grooves (14) are partly filled with an elastomeric material (17) which is of a different colour to the head material.

3. A toothbrush according to claim 1 *characterised* in that the head (21, 31) is wholly surrounded by a frame (22, 32) which is an integral extension of the handle (23,33), the space between the head (21, 31) and the frame (22, 32) being partly or wholly filled with an elastomeric material.

4. A toothbrush according to claim 3 characterised in that the head (21, 31) is linked to the frame at one or more points around the perimeter of the frame in a plane that includes the longitudinal axis of the handle.

5. A toothbrush according to claim 3 characterised in that the head (21, 31) is linked to the frame at one or more points around the perimeter of the frame in a plane at 90° to the longitudinal axis of the handle.

6. A toothbrush according to claim 1, 2 or 3 *characterised* in that the grooves (14, 28, 38) are aligned transverse to the longitudinal axis of the toothbrush.

7. A toothbrush according to claim 1 or 3 *characterised* in that the grooves (14, 28, 38) are aligned parallel to the longitudinal axis of the toothbrush.

8. A toothbrush according to claim 1 or 3 *characterised* in that there are grooves (14, 28, 38) aligned both transverse to and parallel to the longitudinal axis of the toothbrush.

9. A toothbrush according to claim 1, 2 or 3, *characterised* in that there is only one groove (14, 28, 38), dividing the head into two segments.

10. A toothbrush according to claim 1 *characterised* in that the depth, width or frequency per unit distance along the length or across the width of the head (11, 21, 31) of the grooves (14, 28, 38), varies with distance.

## Patentansprüche

1. Zahnbürste mit einem Handgriff (12, 23, 33) und an dessen einem Ende einen Borsten aufweisenden Kopf (11, 21, 31) mit zwei oder mehreren Segmenten (15, 27, 37), die miteinander und/oder mit dem Handgriff (12, 23, 33) flexibel und elastisch verbunden sind, wobei ein oder mehrere der Segmente (15, 27, 37) Borsten aufweist, dadurch gekennzeichnet, daß der Kopf (11) an einer Seite angeordnete Borsten (16) und an der gegenüberliegenden Seite eine oder mehrere darin ausgebildete Nuten (14) aufweist, wobei die Segmente (15) die Inseln zwischen den Nuten (14) bilden, wobei die Nuten (14) vollständig oder teilweise mit einem elastomeren Material (17) gefüllt sind.

2. Zahnbürste nach Anspruch 1, dadurch gekennzeichnet, daß der Zahnbürstenkopf (11) an einem Ende eines Handgriffs (12) einstückig ausgebildet ist, und der Kopf (11) zwei im wesentlichen parallele Seiten aufweist, wobei an einer Oberseite Borsten angeordnet sind, die als mehrere Büschel (13) verteilt sind, die Unterseite durch eine Folge von parallelen Nuten (14) quer zur Längsachse A-A des Handgriffs in Segmente (15) unterteilt ist, die die Inseln zwischen den Nuten (14) bilden, wobei an dem Boden der Nuten (14) ein verdünnter und folglich flexibler und elastischer Bereich des Kopfmaterials (16) zurückbleibt, die Borsten (13) in diesen Segmenten (15) angeordnet sind, und die Nuten (14) mit einem elastomeren Material (17) teilweise gefüllt sind, das eine von dem Kopfmaterial verschiedene Farbe hat.

3. Zahnbürste nach Anspruch 1, dadurch gekennzeichnet, daß der Kopf (21, 31) durch einen Rahmen (22, 32) vollständig umgeben ist, der eine einstückige Verlängerung des Handgriffs (23, 33) ist, der Abstand zwischen dem Kopf (21, 31) und dem Rahmen (22, 32) teilweise oder vollständig mit einem elastomeren Material gefüllt ist.

4. Zahnbürste nach Anspruch 3, dadurch gekennzeichnet, daß der Kopf (21, 31) mit dem Rahmen an einem oder mehreren Punkten um den Umfang des Rahmens in einer Ebene verbunden ist, die die Längsachse des Handgriffs aufweist.

5. Zahnbürste nach Anspruch 3, dadurch gekennzeichnet, daß der Kopf (21, 31) mit dem Rahmen an einem oder mehreren Punkten um den Umfang des Rahmens in einer Ebene verbunden ist, die um 90° gegenüber der Längsachse des Handgriffs versetzt ist.

6. Zahnbürste nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß die Nuten (14, 28, 38) quer zur Längsachse der Zahnbürste ausgerichtet sind.

7. Zahnbürste nach Anspruch 1 oder 3, dadurch gekennzeichnet, daß die Nuten (14, 28, 38) parallel zur Längsachse der Zahnbürste ausgerichtet sind.

8. Zahnbürste nach Anspruch 1 oder 3, dadurch gekennzeichnet, daß die Nuten (14, 28, 38) sowohl quer zur als auch parallel zur Längsachse der Zahnbürste ausgerichtet

9. Zahnbürste nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß nur eine Nut (14, 28, 38) vorhanden ist, die den Kopf in zwei Segmente unterteilt.

10. Zahnbürste nach Anspruch 1, dadurch gekennzeichnet, daß die Tiefe, Breite und Anzahl pro Einheitsabstand entlang der Länge oder über die Breite des Kopfes (11, 21, 31) der Nuten (14, 28, 38) mit dem Abstand variiert.

**Revendications**

1. Brosse à dents ayant un manche (12, 23, 33) et à une extrémité de celui-ci une tête (11, 21, 31) portant des poils sous la forme de deux ou plusieurs segments (15, 27, 37) reliés de façon flexible et élastique les uns aux autres et/ou au manche (12, 23, 33), un ou plusieurs des segments (15, 27, 37) portant des poils, caractérisée en ce que la tête (11) a une face sur laquelle sont montés des poils (16) et la face opposée dans laquelle sont ménagées une ou plusieurs rainures (14), ces segments (15) étant les plats entre les rainures (14), les rainures (14) étant remplies totalement ou en partie d'un matériau élastomère (17).

2. Brosse à dents suivant la revendication 1, caractérisée en ce que la tête (11) de la brosse à dents est formée de façon à faire corps avec une extrémité d'un manche (12), la tête (11) a deux faces pratiquement parallèles, des poils distribués en plusieurs touffes (13) sont montés dans une face supérieure, la face inférieure est divisée par une série de rainures parallèles (14) transversales par rapport à l'axe longitudinal A-A du manche en segments (15) qui sont des plats entre les rainures (14), laissant une région amincie et donc flexible et élastique de matériau de la tête (16) au fond des rainures (14), les poils (13) sont montés dans ces segments (15), et les rainures (14) sont remplies en partie avec un matériau élastomère (17) qui est d'une couleur différente de celle du matériau de la tête.

3. Brosse à dents suivant la revendication 1, caractérisée en ce que la tête (21, 31) est totalement entourée d'un cadre (22, 32) qui est un prolongement faisant corps avec le manche (23, 33), l'espace entre la tête (21, 31) et le cadre (22, 32) étant rempli totalement ou en partie d'un matériau élastomère.

4. Brosse à dents suivant la revendication 3, caractérisée en ce que la tête (21, 31) est reliée au cadre en un ou plusieurs points auteur du périmètre du cadre dans un plan qui comprend l'axe longitudinal du manche.

5. Brosse à dents suivant la revendication 3, caractérisée en ce que la tête (21, 31) est reliée au cadre en un ou plusieurs points autour du périmètre du cadre dans un plan situé à 90° par rapport à l'axe longitudinal du manche.

6. Brosse à dents suivant les revendications 1, 2 ou 3, caractérisée en ce que les rainures (14, 28, 38) sont alignées dans une direction transversale par rapport à l'axe longitudinal de la brosse à dents.

7. Brosse à dents suivant les revendications 1 ou 3, caractérisée en ce que les rainures (14, 28, 38) sont alignées dans la direction parallèle à l'axe longitudinal de la brosse à dents.

8. Brosse à dents suivant les revendications 1 ou 3, caractérisée en ce qu'il y a des rainures (14, 28, 38) alignées à la fois dans les directions transversale et parallèle par rapport à l'axe longitudinal de la brosse à dents.

9. Brosse à dents suivant les revendications 1, 2 ou 3, caractérisée en ce qu'il n'y a qu'une rainure (14, 28, 38), divisant la tête en deux segments.

10. Brosse à dents suivant la revendication 1, caractérisée en ce que la profondeur, la largeur ou la fréquence par distance unitaire le long de la longueur ou à travers la largeur de la tête (11, 21, 31) des rainures (14, 28, 38), varient avec la distance.

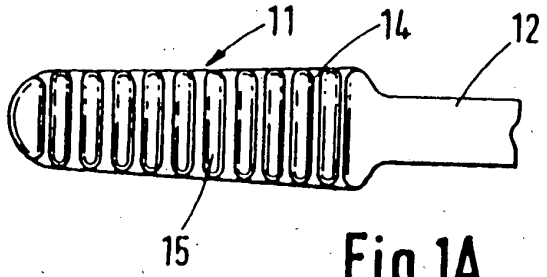


Fig.1A

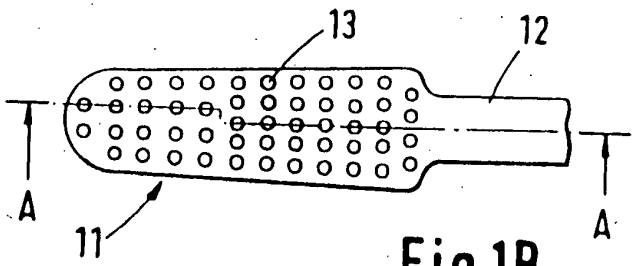


Fig.1B

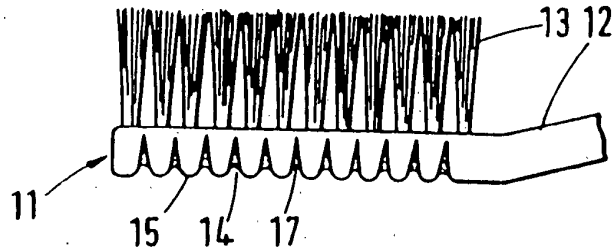


Fig.1C

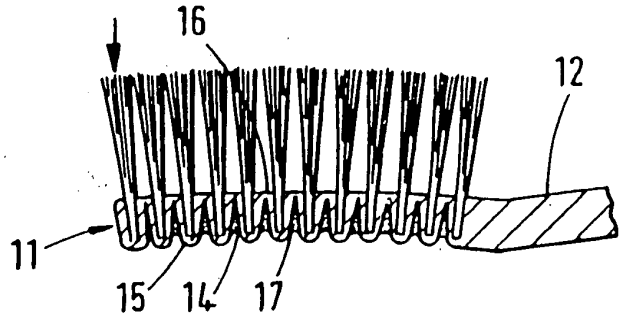


Fig.1D

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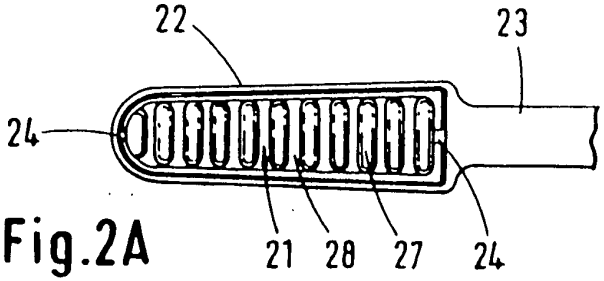


Fig.2A

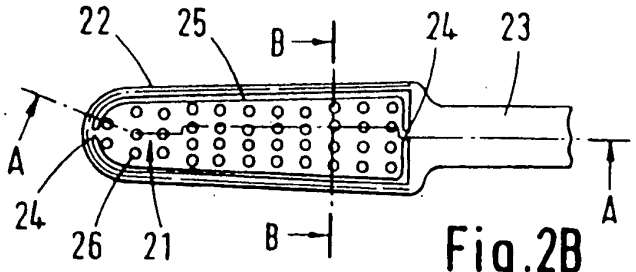


Fig.2B

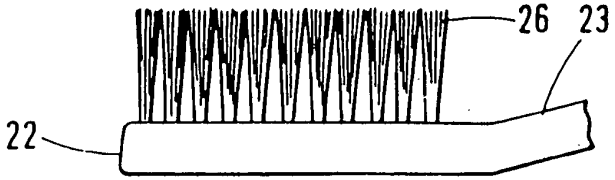


Fig.2C

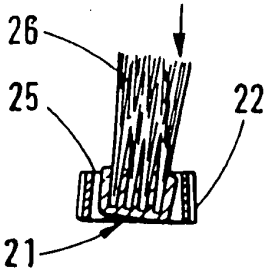


Fig.2D

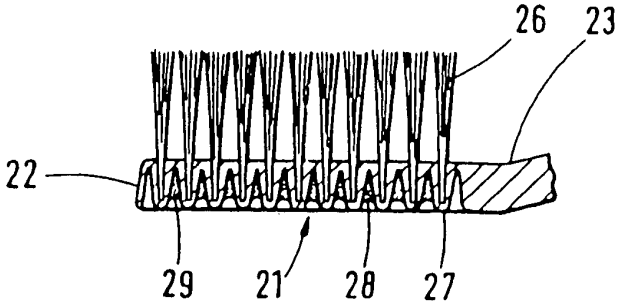


Fig.2E

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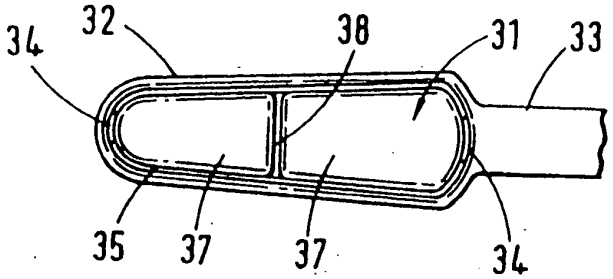


Fig.3A

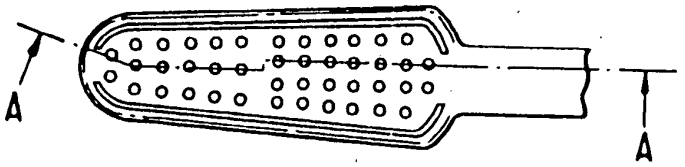


Fig.3B

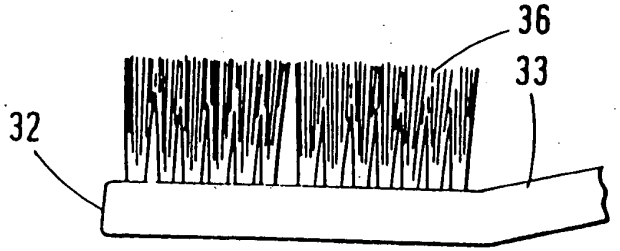


Fig.3C

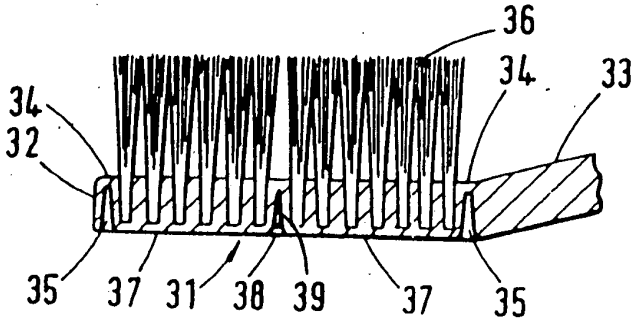


Fig.3D



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